

Claims

What is claimed is:

1 A voice coil actuator arm comprising:

2 a head arm collection including a first head arm, a second head arm and a third
3 head arm;

4 wherein each member of said head arm collection is comprised of:

5 at least one ground plane formed in said head arm collection member; and

6 a first and a second pair of coplanar, parallel transmission paths essentially
7 parallel to said ground plane interconnecting both a read differential wire pair and a write
8 differential wire pair to a head slider, respectively;

9 said first parallel transmission path pair interconnects to a disk drive read
10 interface; and

11 said second parallel transmission path pair interconnects to a disk drive write
12 interface.

1 2. The apparatus of Claim 1,

2 wherein said first head arm is further comprised of:

3 a third and a fourth pair of coplanar, parallel transmission paths essentially
4 parallel to said ground plane interconnecting both a second read differential wire pair and
5 a second write differential wire pair to a second head slider, respectively;

6 said third parallel transmission path pair interconnects to a second disk drive read
7 interface; and

8 said fourth parallel transmission path pair interconnects to a second disk drive
9 write interface.

1 3. The apparatus of Claim 1, further comprising:

2 an analog interface interconnecting said first parallel transmission path and said
3 disk read interface, for at least one of said head arm collection members; and

4 said analog interface interconnecting said second parallel transmission path and
5 said disk write interface, for at least one of said head arm collection members.

1 4. The apparatus of Claim 1, further comprising:
2 an analog interface interconnecting said first parallel transmission path and said
3 disk read interface, for each of said head arm collection members; and
4 said analog interface interconnecting said second parallel transmission path and
5 said disk write interface, for each of said head arm collection members.

1 5. A disk drive comprising said voice coil actuator arm of Claim 1.

1 6. A method for a head arm providing electrical interconnection of a read differential
2 wire pair and a write differential wire pair between a head slider and a disk drive read
3 interface and a disk drive write interface, respectively, comprising the steps of:

4 creating a ground plane in said head arm;
5 providing at least two differential signal paths as essentially parallel, coplanar
6 traces on said head arm traversing an essentially fixed distance parallel to said ground
7 plane as a first differential trace pair and a second differential trace pair;
8 providing connectivity to said head slider for said read differential wire pair and
9 for said write differential wire pair via said first and said second differential trace pair,
10 respectively;
11 providing connection to said disk drive read interface via said first differential
12 trace pair; and
13 providing connection to said disk drive write interface via said second differential
14 trace pair.

1 7. A method providing electrical interconnection by a voice coil actuator arm
2 through at least one head arm between at least one head slider coupled to said head arm
3 and a disk drive read interface and a disk drive write interface, for said head slider,
4 comprising the steps of:

5 said head arm providing electrical interconnection between said head slider and
6 said disk drive read interface and said disk drive write interface as in Claim 6.

1 8. The method of Claim 7, further comprising the steps of:
2 providing a third differential signal path and a fourth differential signal path as
3 essentially parallel, coplanar traces on said head arm traversing essentially parallel to said
4 ground plane as a third differential trace pair and a fourth differential trace pair;
5 providing connectivity to a second head slider for a second read differential wire
6 pair and for a second write differential wire pair via said third differential trace pair and
7 said fourth differential trace pair, respectively;
8 providing connection to a second disk drive read interface via said third
9 differential trace pair; and
10 providing connection to a second disk drive write interface via said fourth
11 differential trace pair.

1 9. The method of Claim 8,
2 wherein said voice coil actuator arm is further comprised of a second head arm;
3 and
4 said method is further comprised of the steps of:
5 said second head arm providing electrical interconnection between a third head
6 slider and a third disk drive read interface and a third disk drive write interface as in
7 Claim 6.

1 10. The method of Claim 9,
2 wherein said voice coil actuator arm is further comprised of a third head arm; and
3 said method is further comprised of the steps of:
4 said third head arm providing electrical interconnection between a fourth head
5 slider and a fourth disk drive read interface and a fourth disk drive write interface as in
6 Claim 6.

1 11. The method of Claim 7,
2 wherein the step providing connection to said disk drive read interface via said
3 first differential trace pair is further comprised of the steps of:

4 providing a first read analog interface connection to said first differential trace
5 pair; and

6 providing a first disk read analog interface connection to said disk drive read
7 interface; and

8 wherein the step providing connection to said disk drive write interface via said
9 second differential trace pair is further comprised of the steps of:

10 providing a first write analog interface connection to said second differential trace
11 pair; and

12 providing a first disk write analog interface connection to said disk drive write
13 interface.

1 12. A method of operating a disk drive, comprising: the steps of Claim 7.

1 13. The method of Claim 6, further comprising the steps of:

2 providing a third differential signal path and a fourth differential signal path as
3 essentially parallel, coplanar traces on said head arm traversing an essentially fixed
4 distance parallel to said ground plane as a third differential trace pair and a fourth
5 differential trace pair;

6 providing connectivity to a second head slider for a second read differential wire
7 pair and for a second write differential wire pair via said third and said fourth differential
8 trace pair, respectively;

9 providing connection to a second disk drive read interface via said third
10 differential trace pair; and

11 providing connection to a second disk drive write interface via said fourth
12 differential trace pair.

1 14. A head arm comprising:

2 at least one ground plane formed in said head arm; and

3 a first and a second pair of coplanar, parallel transmission paths essentially
4 parallel to said ground plane interconnecting both a read differential wire pair and a write
5 differential wire pair to a head slider;

6 said first parallel transmission path pair interconnects to a disk drive read
7 interface; and

8 said second parallel transmission path pair interconnects to a disk drive write
9 interface.

1 15. A voice coil actuator arm comprising at least one head arm as in Claim 14.

1 16. The apparatus of Claim 15,

2 wherein said head arm is further comprised of:

3 a third and a fourth pair of coplanar, parallel transmission paths essentially
4 parallel to said ground plane interconnecting both a second read differential wire pair and
5 a second write differential wire pair to a second head slider;

6 said third parallel transmission path pair interconnects to a second disk drive read
7 interface; and

8 said fourth parallel transmission path pair interconnects to a second disk drive
9 write interface.

1 17. The apparatus of Claim 16, further comprising:

2 a second head arm as in Claim 15 interconnecting a third head slider, a third disk
3 read interface and a third disk write interface.

1 18. The apparatus of Claim 17, further comprising:

2 a third head arm as in Claim 15 interconnecting a fourth head slider, a fourth disk
3 read interface and a fourth disk write interface.

1 19. The apparatus of Claim 15, further comprising:

2 an analog interface interconnecting said first parallel transmission path and said
3 disk read interface; and

4 said analog interface interconnecting said second parallel transmission path and
5 said disk write interface.

1 20. A disk drive comprising said voice coil actuator arm of Claim 15.

1 21. The apparatus of Claim 14, further comprising:

2 a third and a fourth pair of coplanar, parallel transmission paths essentially
3 parallel to said ground plane interconnecting both a second read differential wire pair and
4 a second write differential wire pair to a second head slider;

5 said third parallel transmission path pair interconnects to a second disk drive read
6 interface; and

7 said fourth parallel transmission path pair interconnects to a second disk drive
8 write interface.

1 22. A method for manufacturing a head arm electrically interconnecting a head slider
2 with a disk drive read interface and a disk drive write interface, comprising the steps of:

3 creating a ground plane in said head arm; and

4 providing at least two differential signal paths as essentially parallel, coplanar
5 traces on said head arm traversing an essentially fixed distance parallel to said ground
6 plane as a first differential trace pair and a second differential trace pair;

7 wherein providing connectivity to said head slider via said first and said second
8 differential trace pair;

9 wherein said first differential trace pair provides connection to said disk drive
10 read interface; and

11 wherein said second differential trace pair provides connection to said disk drive
12 write interface.

1 23. Said head arm as a product of the process of Claim 22.

1 24. A method of manufacturing a voice coil actuator arm, comprising the steps of:

2 using said head arm of Claim 23 to provide electrical interconnection between
3 said head slider and said disk drive read interface and said disk drive write interface.

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1 25. The method of Claim 24,

2 wherein said head arm is a product of the process of Claim 22 further comprising
3 the steps of:

4 providing a third differential signal path and a fourth differential signal path as
5 essentially parallel, coplanar traces on said head arm traversing an essentially fixed
6 distance parallel to said ground plane as a third differential trace pair and a fourth
7 differential trace pair;

8 providing connectivity to a second head slider for a second read differential wire
9 pair and for a second write differential wire pair via said third and said fourth differential
10 trace pair, respectively;

11 providing connection to a second disk drive read interface via said third
12 differential trace pair; and

13 providing connection to a second disk drive write interface via said fourth
14 differential trace pair.

1 26. The method of Claim 25,

2 wherein said voice coil actuator arm is further comprised of a second head arm;
3 and

4 said method is further comprised of the steps of:

5 manufacturing said second head arm to provide electrical interconnection between
6 a third head slider and a third disk drive read interface and a third disk drive write
7 interface as in Claim 23.

1 27. The method of Claim 26,

2 wherein said voice coil actuator arm is further comprised of a third head arm; and
3 said method is further comprised of the steps of:

4 manufacturing said third head arm to provide electrical interconnection between a
5 fourth head slider and a fourth disk drive read interface and a fourth disk drive write
6 interface as in Claim 23.

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1 28. The method of Claim 24, further comprising
2 providing a first read analog interface connection to said first differential trace
3 pair;
4 providing a first disk read analog interface connection to said disk drive read
5 interface;
6 providing a first write analog interface connection to said second differential trace
7 pair; and
8 providing a first disk write analog interface connection to said disk drive write
9 interface.

1 29. A method of manufacturing a disk drive comprising the step of using said voice
2 coil actuator arm as a product of Claim 24.

1 30. Said disk drive as a product of the process of Claim 29.